well known that in tadpoles, especially, nearly all the cells are heavily laden with yolk granules until a relatively late period of development. Of this the author takes no account. It is quite conceivable that local growth might take place without any general or local increase in the percentage of water. Until the larva is able to take food the increase in the dry weight of the living material is due to assimilation of yolk, and it may be that local growth during this period is due solely to the solution, transference, and assimilation of this food supply stored within the organism. If it can be shown that there is an increase in the percentage of water in a local growth, such, for example, as a gill-bar, it may well be that it is a purely secondary phenomenon. Then the question, What determines excessive local growths? would not resolve itself into, What determines excessive local imbibition of water? but into, What determines excessive transference and assimilation of yolk material? In supposing that local growth is due primarily to the absorption of water, whether active or passive, we are assuming a simplicity of operation that is hardly warranted by the known complexity of living material.

The paper is well illustrated by tables and plotted curves.

The Capacity for Regulation in the Development of Organisms. — The word "regulation," as employed by Driesch, expresses the capacity of an organism to obliterate in development the effects of any malforming influence to which it has been subjected, so that, despite the mutilation, it develops into the normal form. Driesch's former studies had been chiefly made upon developing eggs; he now (*Arch. f. Entwicklungsmech.* Bd. v, Heft 3, 1897) examines some cases of regeneration.

As is known from the studies of Miss Bickford, regenerating stems of Tubularia do not form new tentacles by a sprouting out at the cut edge, but by a metamorphosis of the old tissue of the stem just below the cut. The old tissue thickens along a number of longitudinally lying areas representing the future tentacles, which soon become fully formed. This phenomenon of differentiation in place is called by Driesch reparation. The first question Driesch asks is: If the repairing stem be split lengthwise so that a double head is formed, will the normal number of tentacles be repaired through regulation on each half head? The result showed that nearly or quite the normal number is so formed.

Again, if the head is cut off and regenerated, and then cut off a second time, will the time elapsing before complete reformation be

less after the second cut than after the first? Experiment showed that it is so; that, whereas it takes five and one-half days on the average for regeneration to occur after the first cut, it is effected under otherwise similar conditions in three days after the second. The repetition of the stimulus quickens the response.

If a piece of the stem of Tubularia be cut at both ends, regeneration will take place at both the oral and the aboral end. If, now, in one case the oral end be sealed with wax so that it cannot grow and the aboral be left free to regenerate, will the time required for the formation of the aboral head differ in the two cases? The result showed that regeneration of the aboral head occurred in all cases inside of seven days after the cut when only one head was forming, whereas it took over twelve days when both heads were arising. Regeneration is slower when the formative stuff goes to two points than when it aggregates at only one.

The tentacles of Tubularia surround the oral end at two levels. After decapitation, consequently, reparation of tentacles occurs at two zones, a distal and a proximal. The question arises: What will happen if after reparation has begun in both zones the distal zone is cut off? Will a head with only one zone of tentacles arise? Here the marvelous phenomenon of regulation was most strikingly shown. The normal number of zones was regained, and, indeed, by either one of four modes, all producing the same end result, — the restoration of the perfect form of the adult. These four modes are: (1) by regeneration — the cut end grew out, and in this regenerated part the distal zone of tentacles arose by reparation; (2) by dissolution — the remaining (proximal) zone of tentacles was dissolved and in its place the normal condition of two zones appeared; (3) by replacement — the distal zone having been removed so as to leave the maximum space beyond the proximal zone, a new series of tentacles sometimes arose in this empty space without disturbing the proximal zone; (4) by division — the arising tentacles of the proximal zone disintegrated in their middle, forming the two zones characteristic of normal development. C. B. D.

Determination of Sex in Plants. — The causation of sex in the hemp plant, studied at various times in the past, forms the subject of a short communication in the *Comptes Rendus* of the French Academy for Nov. 15, 1897, by M. Molliard, who concludes from his experiments that the medium in which the plant grows may affect its sex, and that, in this case, contrary to the currently admitted